

## CLAIMS

1. In a wireless communication system supporting mobile IP, a method comprising:
  - sending a registration request message to a home agent wherein the registration request message includes a care-of address;
  - providing a home address for a mobile node;
  - associating the home address with the care-of address;
  - providing an inactivity timer for the mobile node at the home agent;
  - monitoring a condition of the home agent; and
  - starting a reclaiming resources process at the home agent through use of the inactivity timer for the mobile node when the condition satisfies an overload condition.
2. The method as in claim 1, further comprising sending a series of ICMP echo request messages to the mobile node when the condition satisfies the overload condition and when the inactivity timer for the mobile node is expired.
3. The method as in claim 2, further comprising resetting the inactivity timer for the mobile node if an ICMP echo reply message is received in response to any of the ICMP echo request messages of a series of ICMP echo request messages.
4. The method as in claim 2, further comprising reclaiming a resource of the home agent if all of the ICMP echo request messages timeout.
5. The method as in claim 2, further comprising reclaiming the resource of the home agent if the home agent receives an ICMP destination host unreachable error from a foreign agent in response to any ICMP echo request message of a series of ICMP echo request messages.

6. The method as in claim 2, further comprising reclaiming the resource of the home agent if the home agent receives the ICMP destination host unreachable error from an intervening node in response to a last ICMP echo request message of the series of ICMP echo request messages.
7. The method as in claim 2, further comprising reclaiming the resource of the home agent if the home agent receives the ICMP destination host unreachable error from an intervening node in response to any ICMP echo request message of the series of ICMP echo request messages.
8. The method as in claim 1, wherein the reclaiming resources process is started when the condition satisfies the overload condition defined by UPPER\_OL data.
9. The method as in claim 8 further comprising continuing the reclaiming resources process until the condition is lower than the overload condition defined by LOWER\_OL data.
10. The method as in claim 1 wherein the condition relates to availability of IP addresses.
11. A home agent for use in a wireless communication system supporting mobile IP, the home agent comprising:
  - a plurality of mobility bindings, wherein each mobility binding comprises:
    - a home address provided by the home agent for use by a corresponding mobile node;
    - a care-of address received from the corresponding mobile node when the corresponding node sent a registration request message;
    - a lifetime value defining the term of validity for the home address;
    - and
    - an inactivity timer for the corresponding mobile node to monitor an activity status of the corresponding mobile node, wherein the home agent is configured to create the inactivity timer

for the corresponding mobile node when the mobility binding is created for the corresponding mobile node.

12. The home agent as in claim 11, further comprising a resource condition that represents a current capacity of a home agent resource.
13. The home agent as in claim 12, wherein the home agent is configured to enter a resource reclaiming process when the resource condition satisfies an overload condition.
14. The home agent as in claim 13, wherein the resource reclaiming process searches each mobility binding of the plurality of mobility bindings for expired inactivity timers, and for each mobility binding with an expired inactivity timer the home agent implements a method comprising sending a series of ICMP echo request messages to a mobile node from the mobility binding with the expired inactivity timer.
15. The home agent as in claim 14, wherein the method further comprises resetting the expired inactivity timer if an ICMP echo reply message is received in response to any of the ICMP echo request messages of a series of ICMP echo request messages.
16. The home agent as in claim 14, wherein the method further comprises reclaiming a portion of the home agent resource if all of the ICMP echo request messages timeout.
17. The home agent as in claim 14, wherein the method further comprises reclaiming the portion of the home agent resource if the home agent receives an ICMP destination host unreachable error from a foreign agent node in response to any ICMP echo request message of a series of ICMP echo request messages.

18. The home agent as in claim 14, wherein the method further comprises reclaiming the portion of the home agent resource if the home agent receives the ICMP destination host unreachable error from an intervening node in response to a last ICMP echo request message of the series of ICMP echo request messages.
19. The home agent as in claim 11, further comprising UPPER\_OL data that defines an upper limit of the overload condition.
20. The home agent as in claim 14, wherein the method further comprises reclaiming the portion of the home agent resource if the home agent receives the ICMP destination host unreachable error from an intervening node in response to any ICMP echo request message of the series of ICMP echo request messages.
21. The home agent as in claim 20, further comprising LOWER\_OL data that defines a lower limit of the overload condition.
22. The home agent as in claim 21, wherein the home agent is further configured to enter the resource reclaiming process when the resource condition satisfies the overload condition defined by the UPPER\_OL data.
23. The home agent as in claim 22, wherein the home agent is further configured to continue the resource reclaiming process until the resource condition is lower than the overload condition defined by LOWER\_OL data.
24. The home agent as in claim 11 wherein the resource condition relates to availability of IP addresses.
25. In a wireless communication system supporting mobile IP, a method comprising:

sending a registration request message from a mobile node to a home agent wherein the registration request message includes a care-of address;

creating a mobility binding for the mobile node at the home agent, wherein the mobility binding comprises:

- a home address provided by the home agent for use by the mobile node;
- the care-of address;
- a lifetime value defining the term of validity for the home address;
- and
- an inactivity timer for the mobile node to monitor an activity status of the mobile node;

entering an overload condition at the home agent; and

starting a reclaiming resources process at the home agent if the inactivity timer has expired.

26. The method as in claim 25, further comprising sending a series of ICMP echo request messages to the mobile node when the inactivity has expired.
27. The method as in claim 26, further comprising resetting the inactivity timer if an ICMP echo reply message is received in response to any of the ICMP echo request messages of a series of ICMP echo request messages.
28. The method as in claim 26, further comprising reclaiming a resource of the home agent if all of the ICMP echo request messages timeout.
29. The method as in claim 26, further comprising reclaiming the resource of the home agent if the home agent receives an ICMP destination host unreachable error from a foreign agent node in response to any ICMP echo request message of the series of ICMP echo request messages.
30. The method as in claim 26, further comprising reclaiming the resource of the home agent if the home agent receives the ICMP destination host

unreachable error from an intervening node in response to the last ICMP echo request message of the series of ICMP echo request messages.

31. The method as in claim 26, further comprising reclaiming the resource of the home agent if the home agent receives the ICMP destination host unreachable error from an intervening node in response to any ICMP echo request message of the series of ICMP echo request messages.
32. The method as in claim 26, wherein the overload condition is entered based on an upper limit.
33. The method as in claim 32, further comprising ending the reclaiming resources process at the home agent based on a lower limit.
34. The method as in claim 25, wherein the reclaiming resources process reclaims IP addresses.
35. The method as in claim 25, wherein the reclaiming resources process reclaims memory.
36. The method as in claim 25, wherein the reclaiming resources process releases processing resources.
37. A home agent for use in a wireless communication system supporting mobile IP, wherein the home agent is configured to implement a method comprising:
  - storing a plurality of mobility bindings, wherein each mobility binding corresponds to an individual mobile node, and wherein each mobility binding comprises:
    - a home address provided by the home agent for use by the individual mobile node;
    - a care-of address received from the individual mobile node and used by the home agent to forward data to the individual mobile node;

a lifetime value defining the term of validity for the home address;  
and  
an inactivity timer for the individual mobile node to monitor an  
activity status of the corresponding mobile node;  
monitoring a resource condition that represents a current capacity of a  
home agent resource, and starting a resource reclaiming process  
when the resource condition satisfies an overload condition.

38. The home agent as in claim 37, wherein the resource reclaiming process searches each mobility binding of the plurality of mobility bindings for expired inactivity timers, and for each mobility binding with an expired inactivity timer the home agent sends a series of ICMP echo request messages to the individual mobile node.
39. The home agent as in claim 38, wherein the resource reclaiming process resets the expired inactivity timer if an ICMP echo reply message is received in response to any of the ICMP echo request messages of a series of ICMP echo request messages.
40. The home agent as in claim 38, wherein the resource reclaiming process reclaims a portion of the home agent resource if all of the ICMP echo request messages timeout.
41. The home agent as in claim 38, wherein the resource reclaiming process reclaims a portion of the home agent resource if the home agent receives an ICMP destination host unreachable error from a foreign agent node in response to any ICMP echo request message of the series of ICMP echo request messages.
42. The home agent as in claim 38, wherein the resource reclaiming process reclaims a portion of the home agent resource if the home agent receives the ICMP destination host unreachable error from an intervening node in response to the last ICMP echo request message of the series of ICMP echo request messages.

43. The home agent as in claim 38, wherein the resource reclaiming process reclaims a portion of the home agent resource if the home agent receives the ICMP destination host unreachable error from an intervening node in response to any ICMP echo request message of the series of ICMP echo request messages.
44. The home agent as in claim 37, further comprising UPPER\_OL data that defines an upper limit of the overload condition.
45. The home agent as in claim 44, further comprising LOWER\_OL data that defines a lower limit of the overload condition.
46. The home agent as in claim 45, wherein the home agent starts the resource reclaiming process when the resource condition satisfies the overload condition defined by the UPPER\_OL data.
47. The home agent as in claim 46, wherein the home agent continues the resource reclaiming process until the resource condition is lower than the overload condition defined by LOWER\_OL data.
48. The home agent as in claim 37 wherein the resource condition relates to availability of IP addresses.
49. A home agent for use in a wireless communication system supporting mobile IP, the home agent comprising:  
means for servicing registration requests from mobile nodes;  
means for providing home addresses to the mobile nodes;  
means for binding the home addresses to care-of addresses;  
means for monitoring the activity of each mobile node individually;  
means for monitoring a resource condition that represents a current capacity of a home agent resource; and  
means for reclaiming the home agent resource.